DISTRUBUTION OF RADIONUCLIDES IN CENTRAL REGIONS OF AZERBAIJAN

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Təqdim olunan məqalədə Mingəçevir - Kür ovalığında təbii radionuklidlərin ilkin olaraq necə paylandığı öyrənilmişdir. radionuklidlərin (Ra – 226, Th – 232(Ra - 228), K – 40, Cs - 137) suda və torpaqda miqdarı qamma spektrometrik metodla təyin edilib.

В предложенной статье было исследовано первичное распространение естественных радионуклидов в Мингачаур-Куринской низменности. Количество радионуклидов (Ra - 226, Th-232(Ra-228), K - 40, Cs - 137) в воде и почве определено гамма спектрометрическим методом.

In the suggested article distribution of natural radionuclides in Mingecevir – Kur lowland. The was in investigated quantity of radionuclides (Ra - 226, Ra-228, K - 40, Cs - 137) in soil and water samples determined by gamma-spectrometric methods.

INTRODUCTION

Water is the most spread natural resource on the earth. It plays a vital role in both environment and human life. Among all fresh water resources, groundwater is the most widely distributed, one on the earth. The rise and decline of civilizations was connected to climatic changes which, in its turn, controlled the natural recharge of aquifers and regulated the pollution of groundwater and soils.

Activity of rock, process increasing alkalify of soil by ground water sorbsion of radionuclides in soil and other factors impact to the specific activity of natural radionuclides in soil. Energies of γ – rays penetrates natural radionuclides not below 2.6 MeV and is partially sorbed by soil. The basic radiation particle by a terrestrial surface are radionuclides with thickness 30 sm of ground.

In several zones of Azerbaijan (especially in central Aran regions) geological, ecological process that happen in environment and ground waters rise to the surface and af the result controls irrigation in agriculture at the of this mineral composition changes upper surface layer and therefore condition appear for of the appearance radionuclides in solution situation which situated in upper surface and mixing with surface water. Analyzes of radionuclide composition ground water allowed getting information about environmental pollution in such areas.

Recently radon-222 produced through α-decay of radium-226 with a half-life of 3.8 days has found an increasing use in geothermal investigations. The amount of radon-222 reaching a well discharge depends largely on the distribution of radium-226, present in the rock matrix or dissolved in the water. Radon transients measured after rapid variations in flow rates allow conclusions making on the distribution of liquid and vapor phases underground and processes accompanying vapor formation, especially in vapor-dominated systems. Natural radon concentration is always in excess in lake waters with respect to the radioactive equilibrium with the parent, because it is introduced into the lake also by groundwater and by release from bottom sediments. These factors, which cannot be controlled, make the dissolved environmental radon generally impracticable for gas exchange investigations in lakes.

First of all the aim of this work is to determine the quantity of radionuclides and theirs distribution in the Mingecevir – Kur lowland which is selected for investigation.

MATERIALS AND METHODS

Environmental isotope analyses provide information on the origin and the age distribution of ground waters and therefore are a well suitable toll for the study of fractured systems in hydrology, especially if one considers that other hydrological tools can only be employed with difficulty. For these reasons, it is expected that isotope studies in quartz hydrology will expand markedly in the near future in close connection with refined temperature and conductivity measurements and with determination of major ions. Rivers of Azerbaijan carry large quantity of sediment, which leads to erosion in the river basins. The river water is polluted by impact of human factors and at the result of drainage of salty underground waters in plain areas the salinity increaseg, the chemical structure becomes complicated and the water type changes. These cases are observed in Shirvan. in the streams of Kur flowing along Mil-Karabagh lowlands as well as in Kur itself and also in Araz river.

Picture 1. Gamma – spectrometer

Their average annual pollution rate changes from 0.07 to 9 kg-1 cubic meter per region. The Kur river is the largest river of Azerbaijan. It stretches for 1,515 kilometers and covers an area of 188 thousand sq. km. Kur originates from the Hel river in Turkey, runs through Azerbaijan and flows into the Caspian Sea in south-eastern part of the country.

Canals of the Azerbaijan Republic are the main sources of irrigation. Canals used for the said purpose extend to 47058.8 kilometers., with canals, used by several farms, accounting

for 8580.3 kilometers and those used only by one farm-for 38478.5 kilometers.

In the investigation area some samples have been taken from drinkable and agricultural waters. This samples have taken from artizan and subartizan water in Mingecevir - Kur lowland and from High Garabag and High Shirvan channels which takes its source from Mingachevir lake and Kur and Alijan river .

Samples have been taken from different places of settlement and villages which border other regions generally 26 (water and soil) and have been prepared for the analysis on standard methods. Samples of ground have been dried up, cleared and homogenized. Then the sample of ground have been shifted through a sieve and have been put in marinelly. For creation of radioactive balance the samples of ground in marinelly were stored for a month. Measurement was conaneted by very sensitive gamma - spectrometer and detector RAD-7. Spectrum of samples was removed within 4 hours by gamma – spectrometer.

Nowadays samples have been taken from artizans and subartizans which are situated in different depths in Mingecevir - Kur lowland and have been analysed. Artizan water is used for drinking, but subartizan waters are used either for drinking or in agricaltural.

RESULTS AND DISCUSSION

Results of radionuclid analysis of artizan and subartizan waters, ground and soil samples which had been taken from investigation areas were shown in table 1,2 .

CONCLUSION

Radionuclide composition of ground water and upper layer of soil and artisan water in the Mingecevir - Kur lowland of Azerbaijan Republic was investigated.

Result of analyses shows artificial radionuclides hasn't occurred in the Mingecevir - Kur lowland.

The taken samples from the Mingecevir - Kur lowland change in (0.16 Bk/l – 433 Bk/kg) this range.

Results of investigation in the Mingecevir - Kur lowland show the results of analyses suitable international norm and water and soil is useful in the areas.

Typical γ-specters observed in water samples was shown in table 1.

The results of analyzes in ground water sample were shown in table 2.

Table 1.

Places of taken ground water sample	^{226}Ra *(Bk/L)*	^{40}K *(Bk/L)*	^{137}Cs *(Bk/L)*	depth, m
Agdash	0.20±0.1	12,42±0.56	<1.0	2.3
Agcabedi	<0.36	<9.24	<1.28	1
Geychay	<1.2	<9.23	<0.56	2
Barda	0.394±0.150	15.6±1.4	<0.394	1
Zardab	<0.54	12.96±1.38	<0.40	1.5
Yevlakh	<0.80	<19.6	<1.68	2
Yevlakh	<0.62	6.2±1.2	<1.2	2.5

The results of analyzes in soil sample were shown in table 3.

Table 2.

Places of taken soil sample	^{226}Ra *(Bk/kq)*	^{232}Th *(Bk/kq)*	^{40}K *(Bk/kq)*	^{137}Cs *(Bk/kq)*
Agdash	35.8 ± 0.8	51.6 ± 1.6	883.0 ± 19.2	<1.7
Agcu	22.2 ± 0.8	15.4 ± 0.6	458.0 ± 12.0	2.0 ±0.2
Geychay	29.2 ± 0.8	42.6 ± 1.4	690.0 ± 16.0	<1.4
Barda	26.8 ± 0.8	32.2 ± 1.4	609.0 ± 15.0	<1.2
Agcabedi	20.4 ± 1.0	26.0 ± 1.4	518.0 ± 14.0	<1.5
Zardab	15.2 ± 0.6	19.8 ± 0.6	390.0 ± 8.0	0.9± 0.22
Yevlakh	32.0 ± 1.0	8.8 ± 1.0	262.0 ± 10.6	<1.06
Yevlakh	14.2 ± 0.8	31.0 ± 0.8	588.0 ± 16.0	<0.8

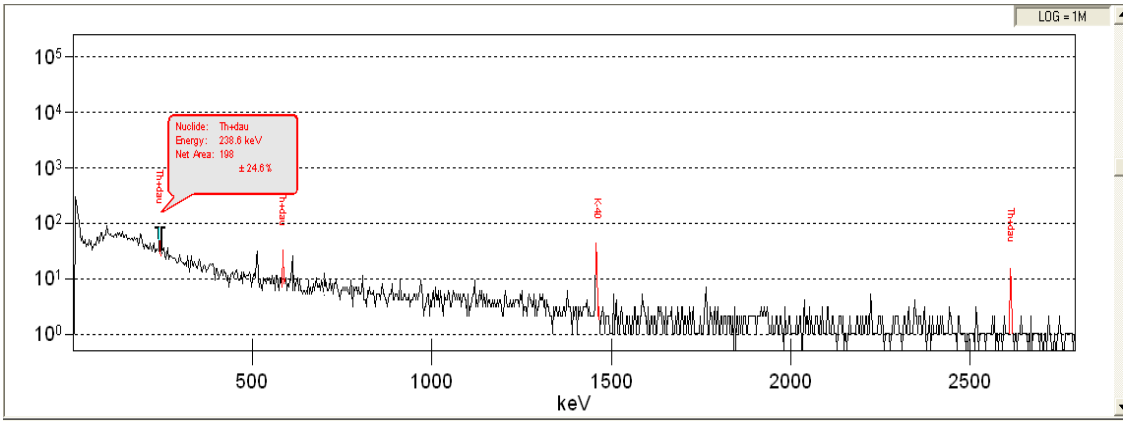

Fig. 1. Typical γ-specter observed in water samples

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